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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/653,157	08/31/2000	Kevin J. Torek	MI22-1376	4651

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WELLS ST. JOHN P.S.
601 W. FIRST
SUITE 1300
SPOKANE, WA 99201-3828

EXAMINER

DEO, DUY VU

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 05/24/2002

9

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/653,157

Applicant(s)

TOREK ET AL.

Examiner

DuyVu n Deo

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 April 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-6 is/are allowed.
- 6) ☒ Claim(s) 7-35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1, 7, 12, 25 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. While pages 4-5 of specification describe using a feed gas comprising 99.999% by V of oxygen, it doesn't describe feeding the feed gas in an absence of additionally added gases.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 7, 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Harada et al. (US 5,631,868).

Harada describes a method for removing an organic compound such as photoresist from a semiconductor substrate comprising: feeding an feed gas consisting of an oxygen gas (having a purity of at least 99.999%) supplemented with CO or CO₂ through an ozone generator to

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generate ozone (this feed gas would comprise less than or equal to 0.001% of N₂ because it contains no nitrogen); and contacting the ozone with the resist on the substrate to remove the resist (claim 1; col. 2, line 56-60; col. 7, line 5, line 38-40; col. 9, line 26-30). Since the CO or CO₂ is a part of the feed gas, which is the only gas fed into the ozone generator, the feed gas is introduced to the ozone generator in an absence of any additionally added gases.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Harada as applied to claim 7 above, and further in view of Ury et al. (US 4,885,047).

Unlike claimed invention, Harada doesn't describe irradiating at least some of the ozone with UV prior to the contacting. Ury describes a same method of removing resist wherein he teaches of using ozone and irradiating the resist with during the process. Some of the ozone would have to be irradiated with UV to create ozone fragments prior to the contacting and proximate the resist during the process. (col. 4, line 19-39). It would have been obvious for one skill in the art to modify Harada in light of Ury because Ury teaches that UV may provide an enhancement of the stripping time.

7. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Harada as applied to claim 7 above, and further in view of De et al. (JP411219926A).

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Unlike claimed invention, Harada doesn't describe mixing ozone with water vapor prior to contacting. However, removing resist with ozone and water vapor has been known to one skill in the art at the time of the invention such as one taught by De (ab.). Therefore, at the time of the invention one skill in the art would find it obvious to remove resist in light of De by using ozone and water vapor, which would enhance the removal process since water would provide another source of oxidizing agent to remove the photoresist with an anticipation of an expected result.

8. Claims 11-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harada as applied to claim 7 above, and further in view of Mullee (US 6,306,564).

Unlike claimed invention, above prior art doesn't describe mixing the ozone with organic solvent vapor prior to the contacting. Mullee describes a method of removing the photoresist wherein the photoresist is removed using a combination of ozone and organic solvent such as acetone, isopropanol (col. 4, line 11-30). It would have been obvious for one skill in the art to add organic solvents into the mixture because Mullee teaches that organic solvents would remove organic contaminants from the wafer surface (col. 4, line 22-24).

Even though Mullee doesn't describe using the organic solvents as vapors; however, he describes the chemicals are heated and carried by a gas into the reaction chamber so that less chemical is needed to remove the photoresist (summery; col. 2, line 56-60). It would have been obvious for one skill in the art at the time of the invention to use vapors of organic solvents because a vapor would have been easier to carry into the chamber and less amount of chemicals are used to remove photoresist.

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Referring to claims 14-15, even though above prior art doesn't describe the metal layers exposing to chemicals (i.e. ozone) are Al_2O_3 or platinum; however, using the photoresist to etch a substrate that includes aluminum oxide or platinum are known to one skill in the art and would depending on the type of device being processed (please see below cited art). Removing the resist would also expose the aluminum oxide or Pt to the ozone.

Referring to claim 17, it would be obvious that the solvents' reservoirs can be anywhere within or outside the chamber as long it could provide organic vapor for the resist removal.

Referring to claims 20, 21, it would have been obvious for one skill in the art to use other organic solvent such as cyclohexanone to remove photoresist with an anticipation of an expected result.

9. Claims 25-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harada, Mullee and further in view of Ury et al. (US 4,885,047).

Unlike claimed invention, above prior art doesn't describe irradiating at least some of the ozone with UV prior to the contacting. Ury describes a same method of removing resist wherein he teaches of using ozone and irradiating the resist with during the process. Some of the ozone would have to be irradiated with UV to create ozone fragments prior to the contacting and proximate the resist during the process. (col. 4, line 19-39). It would have been obvious for one skill in the art to modify above prior art in light of Ury because Ury teaches that UV may provide an enhancement of the stripping time.

10. Nomoto (US 6,133,603) and Dahlheim et al. (US 5,540,047) cited to show prior art.

Response to Arguments

11. Applicant's arguments filed 4/26/02 have been fully considered but they are not persuasive.

Applicant's argument that Harada describes the oxygen is supplemented with N2 is acknowledged. He also describes the oxygen is supplemented with other gases CO or CO2 (col. 2; claim 1). Furthermore, because nitrogen would form NOx, which needed to be removed by using a filter as taught by Harada (summary), it would be obvious for one skill in the art to not to use N2 in the first place.

In response to applicant's argument that Harada doesn't describe feeding the feed gas into the ozone generator in an absence of additionally added gases, since the oxygen and CO is a part of the feed gas; therefore, when the feed gas is supplied into the ozone generator, there is no other gas other than the feed gas (claimed in an absence of additionally added gases).

Allowable Subject Matter

12. Claims 1-6 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action.

Claims 1-6 are allowable because the closest prior art, Harada, doesn't describe using the feed gas comprising 99.999% by V of oxygen. He describes using oxygen supplemented with 12-20 % of CO or CO2.

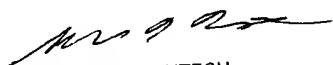
Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to DuyVu n Deo whose telephone number is 703-305-0515.

DVD
May 23, 2002


BENJAMIN L. UTECH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY 1700